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REMARKS

Claims 1-10 and 15-22 were pending in this application. Claims 2, 6, 7, and 15-22 have been cancelled without prejudice or disclaimer. Claims 1, 3, 4, 5, 8, 9, and 10 have been amended. New claims 23-35 have been added. As a result claims 1, 3-5, 8-10, and 23-35 are pending for examination, with claims 1 and 23 being independent claims. No new matter has been added. Support for the amendments as well as the new claims can be found throughout the specification as filed; see, for example, pages 13 *et seq.*

Objection to Claim 22

Claim 22 has been objected to because of informalities.

The objection to claim 22 has been rendered moot because claim 22 has been cancelled, without prejudice or disclaimer, to further the prosecution of this application.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the objection.

Rejections under 35 U.S.C. § 112

Claims 9, 10, 20, and 22 have been rejected as being indefinite under 35 U.S.C. § 112, second paragraph.

Claims 9 and 10 have been amended thus overcoming this rejection. In particular, claim 9 has been amended to clarify that the ferrous ion species corresponds to the ferrous chloride species. Claim 10 has been amended to clarify the scope of claim 10 by providing antecedent basis for the limitations recited therein. Therefore, the rejection of claims 9 and 10 has been overcome.

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Without acceding to the propriety of the rejection, claims 20 and 22 have been canceled without prejudice or disclaimer to further the prosecution of this application. Therefore the rejection of claims 20 and 22 has been rendered moot.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 112, second paragraph.

Rejections under 35 U.S.C. § 102

Claims 1, 2, 6, 8, 10, 15, 16, 18, 21, and 22 have been rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Hednäs *et al.* in European Patent Application Publication 0 032 886 (Hednäs *et al.*) as well as the teaching of Krofchak in Canada Patent No. 956553 (Krofchak).

Claim 22 has been further rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Czarnowski in German Patent No. DE4122920, by the teaching of Morimoto in U.S. Patent No. 3,635,664, and by the teaching of Senior *et al.* in U.S. Patent No. 3,787,306.

Applicants respectfully disagree that claims 2, 6, 15, 16, 18 and 22 are anticipated by the cited references. Nonetheless, claims 2, 6, 15, 16, 18, and 22 have been canceled to further prosecution of this application. Therefore, the rejection of these claims has been rendered moot.

Applicants also respectfully disagree that independent claim 1, as well as dependent claims 8 and 10, are anticipated by the teachings of the cited references. Independent claim 1 is patentably distinct from the teachings of the cited references because each reference lacks at least one limitation recited in claim 1. Independent claim 1 recites a method of regenerating a metal pickling process solution comprising steps of providing metal pickling process solution consisting essentially of hydrochloric acid and ferric chloride, adding an acid

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consisting essentially of sulfuric acid to the metal pickling process solution to produce regenerated pickling process solution, cooling the regenerated pickling process solution at a temperature sufficient to crystallize at least a portion of any ferrous sulfate in the regenerated pickling process solution, and removing the crystallized ferrous sulfate salt from the regenerated pickling process solution.

Hedanäs *et al.* teach treating acid pickling solutions by precipitating iron salts, corresponding to the particular acid used, but fail to teach converting or reacting such corresponding iron salt to a less soluble species and, as in one or more aspects relevant to the present invention, to converting or reacting ferrous chloride to ferrous sulfate and crystallizing ferrous sulfate salt. (Hedanäs *et al.* at page 7, lines 24 *et seq.*)

Hedanäs *et al.*, at Fig. 2, at page 7, line 24 to page 8, line 2, and at page 11, line 30 to page 12, line 1, teach treating a hydrochloric acid-based pickling solution by utilizing phosphoric acid to promote crystallization of FeCl_2 , the corresponding iron species generated during the pickling process. Hedanäs *et al.* further provide phase diagrams mapping the solubility of FeSO_4 in a sulfuric acid solution and in a sulfuric acid/phosphoric acid solution but, significantly, not in a hydrochloric acid solution. (*Id.* at Figs. 1 and 3.) Hedanäs *et al.* further teach, at Examples 1 and 2, at page 11, line 30 to page 12, line 4, and at Fig. 3, treating a sulfuric acid based pickling solution by utilizing phosphoric acid to promote crystallization of FeSO_4 , the corresponding iron salt generated during the pickling process. However, Hedanäs *et al.* do not teach a method of regenerating an acid pickling solution comprising a step of converting an iron salt species corresponding to the pickling acid into a less soluble species and crystallizing such a species. For example, Hedanäs *et al.* fail to teach converting a first iron species (e.g. FeCl_2) which corresponds to a first acid (e.g. hydrochloric acid), and which is generated during the pickling process, into a less soluble species (e.g. FeSO_4) and promoting crystallization of the less soluble species. Simply stated, Hedanäs *et al.* teach a method that relies on principles that significantly from those relevant to the present invention, i.e., removing an iron salt species from a pickling solution and replenishing the acid to compensate for its consumption but not a method of regenerating the pickling solution by

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adding a second acid that converts the generated iron salt species into a less soluble species and regenerates the pickling solution.

Therefore, independent claim 1, dependent claims 8 and 10, and new independent claim 26 are not anticipated by the teaching of Hedanäs *et al.* Likewise, dependent claims 3-5, 9-10, and 23-25, as well as dependent claims 27-35, which depend from independent claims 1 and 26 respectively, are not anticipated by the teaching of Hedanäs *et al.* for at least the same reasons. In particular, Hedanäs *et al.* fail to teach a method of regenerating a pickling solution having a step of adding an acid at a temperature that minimizes oxidation of any ferrous species such as at about 30 °F to about 45 °F, at about 0 °F to about 40 °F, at lower than about 40 °F, or even at lower than about 65 °F. Hedanäs *et al.* also fail to teach a method of regenerating a pickling solution reciting a step of decreasing the solubility of ferrous sulfate by, for example, introducing sulfate ions to the pickling solution. Hedanäs *et al.* further fail to teach a method of regenerating a pickling solution having a step of cooling the pickling solution before a conversion step or a step of heating the regenerated pickling solution.

Like Hedanäs *et al.*, Krofchak teaches a pickling solution treating process but fails to teach regenerating a pickling solution consisting essentially of hydrochloric acid and its corresponding salt species, ferrous chloride. Instead, Krofchak teaches a sulfuric acid-based pickling method and replenishing the sulfuric acid-based pickling solution by cooling to crystallize ferrous sulfate species generated during the pickling process and compensating for the acid consumption by adding additional sulfuric acid. (See Krofchak at page 6, lines 1 to 31.) Although Krofchak mentions that hydrochloric acid may be used in conjunction with the sulfuric acid-based pickling solution, Krofchak does not teach a pickling solution or regenerating a pickling solution consisting essentially of hydrochloric acid. (*Id.* at page 6, lines 1 to 9.) Notably, Krofchak emphasizes that the predominant pickling species, sulfuric acid, is maintained within an optimum range, "preferably about 15% to 20%," even if it is consumed, i.e. not regenerated. (*Id.* at page 6, lines 3 to 7 and at lines 28 to 32.) Thus,

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Krofchak, like Hedanäs *et al.*, also teaches a method of treating pickling solution that relies on principles that significantly differ from those relevant to the present invention.

Therefore, independent claims 1 and 26 are also not anticipated by the teaching of Krofchak. Likewise, dependent claims 3-5, 8-10, and 23-25 as well as dependent claims 27-35, which depend from independent claims 1 and 26 respectively, are not anticipated by the teaching of Krofchak for at least the same reasons. Moreover, like Hedanäs *et al.*, Krofchak fails to teach a method of regenerating a pickling solution having a step of adding an acid at a temperature that minimizes oxidation of any ferrous species, such as at about 30 °F to about 45 °F, at about 0 °F to about 40 °F, at lower than about 40 °F, or even at lower than about 65 °F. Krofchak also fails to teach a method of regenerating a pickling solution having a step of decreasing the solubility of ferrous sulfate by, for example, introducing sulfate ions to the pickling solution. Krofchak further fails to teach a method of regenerating a pickling solution having a step of cooling the pickling solution before a conversion step or a step of heating the regenerated pickling solution.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 102.

Rejections under 35 U.S.C. § 103

Claims 1-10 and 15-22 have been rejected as being unpatentable over the teaching of Krofchak under 35 U.S.C. § 103(a). Claims 1-10 and 15-22 have been further rejected as being unpatentable over the teaching of Hedanäs *et al.* under 35 U.S.C. § 103(a).

Applicants respectfully disagree that independent claim 1 would have been obvious over the teaching of Krofchak. As discussed, Krofchak fails to teach regenerating a pickling solution consisting essentially of hydrochloric acid. Moreover, there is no *prima facie* case of obviousness because Krofchak fails to provide any teaching, suggestion, or motivation that would result in the invention as recited in independent claim 1.

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Further, one of ordinary skill in the art would not have been motivated to modify the teaching of Krofchak so as to arrive at the present invention because Krofchak teaches against a pickling solution consisting essentially of hydrochloric acid by emphasizing carrying out the pickling operation "with an aqueous acid solution containing about 8% to 20% and preferably about 15% to 20% by weight of sulphuric acid." (Krofchak at page 6, lines 1 to 8.) Krofchak further teaches away by explicitly limiting any hydrochloric acid to "1% to 3%." (*Id.* at lines 10 to 12.)

Significantly, as discussed above, Krofchak teaches a method that relies on principles that significantly differ from those relevant to the present invention. Thus, even if the teaching of Krofchak could have been modified as suggested, which Applicants do not concede, there would be no reasonable expectation that the proposed modified process would be successful.

Therefore, independent claim 1 as well as dependent claims 3-5 and 8-10, which depend from claim 1, would not have been obvious over the teaching of Krofchak.

Applicants also respectfully disagree that claim 1 would have been obvious over the teaching of Hedanäs *et al.* Also as discussed, Hedanäs *et al.* teach a method of replenishing a pickling solution by removing the generated iron salt generated during the pickling process by promoting its crystallization with the addition of phosphoric acid and compensating for the consumption of the pickling acid. However, Hedanäs *et al.* fails to provide any teaching, suggestion, or motivation for a method of converting the generated iron salt into a less soluble species, thereby regenerating the pickling acid, and crystallizing the less soluble species. Thus, like Krofchak, Hedanäs *et al.* fails to provide any basis for a *prima facie* case of obviousness.

Also like Krofchak, even if the teachings of Hedanäs *et al.* could have been modified as proposed, which Applicants also do not concede, there would be no reasonable expectation that it would successfully regenerate spent pickling solution because, as explained above, Hedanäs *et al.* disclose a process of treating pickling solutions based on principles that significantly differ from those relevant to the present invention.

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Therefore, independent claim 1 as well as dependent claims 3-5 and 8-10, which depend from claim 1, would not have been obvious over the teaching of Hedanäs *et al.*

Applicants respectfully disagree that claims 15-22 would have been obvious over the teachings of Krofchak and Hedanäs *et al.* Nonetheless, the rejection of these claims has been rendered moot because these claims have been cancelled without prejudice or disclaimer.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 103.

New Claims

New dependent claims 23-25 depend, ultimately, from independent claim 1. No new matter has been added with these claims and support can be found throughout the specification, including the claims, as originally filed. These claims are also patentably distinct over the teachings of the cited references for at least the same reasons discussed above.

Independent claim 26 and dependent claims 27-35 have also been added. No new matter has been added with these claims and support can be found throughout the specification, including the claims, as originally filed. These claims are also patentably distinct over the teachings of the cited references for at least the same reasons discussed above.

CONCLUSION

In view of the foregoing Amendments and Remarks, this application is in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes that this application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

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If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 500214.

Respectfully submitted,
Douglas R. Olsen et al., Applicants

By: 

Peter C. Lando, Reg. No. 34,654
Elias Domingo, Reg. No. 52,827
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2211
Telephone: (617) 720-3500

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MARKED-UP CLAIMS

Claims 2, 6, 7, and 15-22 have been canceled without prejudice or disclaimer.

Claims 1, 3, 4, 5, 8, 9, and 10 have been amended as follows:

1. (Amended) A method of regenerating a metal pickling process solution [containing a metal salt of a first acid], comprising:
 - [a)] providing [a]said metal pickling process solution [containing a metal salt of a first acid]consisting essentially of hydrochloric acid and ferrous chloride;
 - [b)] adding [a second]an acid consisting essentially of sulfuric acid to said metal pickling process solution to produce a regenerated [first acid]pickling process solution[and a metal salt of said second acid];
 - [c)] cooling the regenerated pickling process solution at a temperature sufficient to crystallize [said metal salt of said second acid]at least a portion of any ferrous sulfate salt in said regenerated pickling process solution; and
 - [d)] removing said [metal salt of said second acid]crystallized ferrous sulfate salt from said regenerated pickling process solution.
3. (Amended) A method as set forth in Claim [2]1, wherein said step of adding [a second]said acid to said metal pickling process solution comprises adding said [second]acid at a temperature lower than about 65 degrees F.
4. (Amended) A method as set forth in Claim [2]1, wherein said step of adding [a second]said acid to said metal pickling process solution comprises adding said [second]acid at a temperature lower than about 40 degrees F.
5. (Amended) A method as set forth in Claim [2]1, wherein said step of adding [a second]said acid to said metal pickling process solution comprises adding said [second]acid at a temperature in the range of about 0 degrees F to about 40 degrees F.
8. (Amended) A method as set forth in Claim 1, further comprising [the]a step of decreasing the solubility of said [metal salt of said second acid]ferrous sulfate salt.

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9. (Twice amended) A method as set forth in Claim 1, wherein said [second] acid is added in excess of [the] a stoichiometric amount required to react with the ferrous [ions] chloride.

10. (Twice amended) A method as set forth in Claim 1, further comprising [the] a step of recycling the regenerated [first acid] pickling process solution to [the source of the metal pickling process acid] a pickling bath.